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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Before the Board of Patent Appeals and Interferences

In re the Application

Inventor : Francois Martin
Application No. : 09/899,878
Filed : July 6, 2001
For : ADAPTIVE PRE-PROCESSING METHOD FOR
MOTION ESTIMATION

APPEAL BRIEF

On Appeal from Group Art Unit 2613

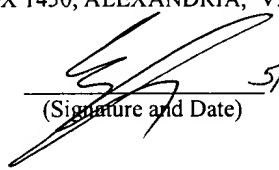
Date: May 10, 2005

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(Signature and Date)

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I. REAL PARTY IN INTEREST

The real party in interest is the assignee of the present application, U.S. Philips Corporation, and not the party named in the above caption.

II. RELATED APPEALS AND INTERFERENCES

With regard to identifying by number and filing date all other appeals or interferences known to Appellant which will directly effect or be directly affected by or have a bearing on the Board's decision in this appeal, Appellant is not aware of any such appeals or interferences.

III. STATUS OF CLAIMS

Claims 1-7 have been presented for examination. All of these claims are pending, stand finally rejected, and form the subject matter of the present appeal.

IV. STATUS OF AMENDMENTS

In response to the patent application filed July 6, 2001, a first Office Action was mailed on July 15, 2004. Claims 1 and 5-7 were rejected under 35 USC §102(e) as being anticipated by Song (USP no. 6,560,371) and claim 2-4 were rejected under 35 USC §103(a) as being unpatentable over Song in view of Hampson ("Motion Estimation in the Presence of Illumination Variations").

On October 13, 2004, a response to the first Office Action was timely filed which presented arguments why the references cited failed to anticipate or render obvious the claimed invention. Amendments were made to the claims to more clearly state the

invention and to correct errors in form. On December 21, 2004, a second and Final Office Action was entered, which again rejected claims 1-7 as being anticipated by Song and rendered unpatentable over Song in view of Hampson. On February 7, 2005, a response to the second and Final Office action was filed, which amended claims 5 and 6 to correct errors in form and presented additional arguments as to why the claimed invention was not anticipated or rendered obvious by the recited references.

An Advisory Action was mailed on February 18, 2005, which maintained the reason for rejecting the claims. The Advisory Action stated that the amendments made to the claims were entered for the purposes of an appeal.

A Notice of Appeal, with appropriate fee, was filed on March 11, 2005. This Appeal Brief is being filed within two (2) months after the filing of the Notice of Appeal.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The present invention provides a method and system for processing an input digital video signal by computing a histogram of original values associated with pixels belonging to a video frame of the digital signal (p. 1, lines 28-29); the histogram values are obtained from at least the luminance of the pixels in the video frame (p. 2, line 6), analyzing the resultant histogram values to obtain histogram parameters and correcting the original pixel values on the basis of the histogram parameters to provide modified pixel values (p. 2, lines 1-4). Figures 2a and 2b illustrate an example of a shift of the histogram values of pixel luminance values when a flash or a fade, respectively, occurs. In the former case, the histogram is shifted toward higher luminance and in the latter case, the histogram is shifted toward the lower luminance. (p. 4, lines 16-24). In one

aspect of the invention, the correction step determines the parameters of the luminance histogram of a current frame and performs a translation to correct the pixel values in the current frame (p. 3, lines 1-8 and figure 3a). A filtering step is optionally performed (see p. 6, lines 20-21).

VI. GROUND FOR REJECTION TO BE REVIEWED ON APPEAL

The issues in the present matter are whether:

1. Independent claim 1 and claims 5-7 are anticipated under 35 USC §102(e) by Song; and
2. Dependent claims 2-4 are obvious under 35 USC §103(a) in view of the combination of Song and Hampson.

VII. ARGUMENTS

I. Rejection of Claims 1 and 5-7 under USC §102(e) as being anticipated by Song.

The Final Office Action states that "Song in Figures 1, 2, 10 and 11, discloses the same method of processing an input digital video signal 110 comprising video frames so as to provide a modified digital video signal 120 for a motion estimation step 140 as specified in claim 1." (see item 3, p. 2, Final Office Action). The Advisory Action states that "column 11 of Song explicitly discloses the concept of histogram." (see first paragraph, p. 2, Advisory Action).

**Difference Between the Claimed Invention
and the Primary Reference – Song**

The instant invention, as recited in claim 1, which is typical of the remaining independent claims, discloses a method for determining a correction value that may be applied to original pixel values to compensate for changes in the values of pixels in a video frame.

Song discloses an apparatus and method using M-ary pyramid decomposition in combination with N-scale tiling to reduce the computational complexity in determining motion vectors. Song describes the M-ary pyramid decomposition with regard to Figure 3 in col. 5, lines 66- col. 6, lines 32, which state in part, “the mean pyramid comprises a plurality of levels 310, 320, 330. The lowest level 310 is an original image frame ... having ... pixels 311. ... [A] next higher level is generated by lowpass filtering and downsampling [of pixels at the lower level]... thereby generating a single pixel value 321 in level 320 [at this higher level]. In turn, ... pixels 322a [are] used to generate a single pixel value 331 in level 330 [a next higher level] ... In a mean pyramid, the parent pixel value is derived by taking the average of its four children pixels.” Song further teaches that video blocks may be tiled using 8x8, 4x8 and 8x4 blocks. The blocks may be processed using the M-ary method described.

Thus, Song teaches progressively combining pixels to obtain a single pixel representative of the pixels in a lower level. More specifically, Song teaches that a single pixel may be obtained as the combination (i.e., an average) of lower level pixels.

Song Fails to Anticipate the Claimed Invention

The Advisory Action, in maintaining the rejection of the claims, states that "column 11 of Song explicitly discloses the concept of a histogram."

"Anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention, *arranged as in the claim.*" Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co., 221 USPQ 481, 485 (Fed. Cir. 1984) (emphasis added).

Contrary to the position stated in the Advisory Action, Song fails to disclose each and every element recited in claim 1. With regard to the reference to column 11, a careful reading of this section of the Song patent reveals that Song teaches using a histogram to perform a comparison of the different tiling methods (see col. 11, lines 54-57, which state "one can set up a histogram to gauge the contribution of different tiling scales with respect to the motion vectors that are ultimately selected for the current blocks of a frame."). Thus, Song teaches performing a histogramming to gauge the contribution of different tiling scales and fails to teach processing the luminance information using a histogram as recited in the claim 1.

Accordingly, Song cannot be said to anticipate claim 1 because Song does not disclose each and every element claimed.

In view of the above, applicant submits that claim 1 is patently distinguishable and allowable over the teaching of Song.

With regard to independent claims 5-7, these claims recite devices and programs, respectively, for executing the processing of claim 1 and have been rejected for the same reason used to reject claim 1. Accordingly, for the remarks made with regard to claim 1,

which are reassert, as if in full herein, applicant submits that these claims are also not anticipated by Song.

In view of the above, applicant submits that all of the above referred-to claims are patentable over the teachings of Song and respectfully requests this honorable board reverse the rejection of the claims.

II. Rejection of Claims 2-4 Under 35 USC §103(a)
in View of Song and Hampson

Claims 2-4 stand rejected as being obvious under 35 USC §103(a) in view of the combination of Song and Hampson.

Claims 2-4 Depend from
Allowable Base Claims

Claims 2-4 depend from independent claim 1, which has been shown to include subject matter not disclosed by and allowable over Song. Applicant respectfully submits that claims 2-4 are allowable at least for their dependence upon an allowable base claim, without even contemplating the merits of the dependent claims for reasons analogous to that held by In re Fine, 837 F.2d 1071, 5 USPQ 2d 1596 (Fed. Cir. 1988) wherein if an independent claim is non-obvious under 35 U.S.C. §103(a), then any claim depending therefrom is non-obvious. In this case, claims 2-4 depend from claim 1, which has been shown to not be anticipated by Song, and, hence, these claims contain subject matter not disclosed by the combination of Song and Hampson.

In view of the above, applicant submits that all of the above referred-to claims are patentable over the teachings of Song and Hampson and respectfully requests this honorable board reverse the rejection of the claims.

VIII. CONCLUSION

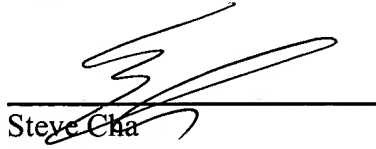
In view of the law and facts stated herein, it is respectfully submitted that the teachings of the primary reference fails to anticipate the claimed invention and the burden of showing that Song discloses all of the features, expressly or inherently, recited in the claims has not been met. In particular, Song neither expressly nor inherently teaches "computing a histogram of luminance or chrominance of original values associated with pixels belonging to a video frame," or "analyzing the histogram to provide histogram parameters," or "correcting the original pixel values on the basis of the histogram parameters to provide modified pixel values," as is recited in the independent claims.

In view of the above analysis, it is respectfully submitted that the referenced teachings, whether taken individually or in combination, fail to anticipate or render obvious the subject matter of any of the present claims. Therefore, reversal of all outstanding grounds of rejection is respectfully solicited.

Respectfully submitted,

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Date: May 10, 2005

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Registration No. 44,069

IX. CLAIMS APPENDIX

The claims on appeal are as follows:

1. A method of processing an input digital video signal comprising video frames so as to provide a modified digital video signal for a motion estimation step said processing method comprises the steps of:

- computing a histogram of luminance or chrominance of original values associated with pixels belonging to a video frame,
- analyzing the histogram to provide histogram parameters, and
- correcting the original pixel values on the basis of the histogram parameters to provide modified pixel values, which yields the modified digital video signal to be used by the motion estimation step.

2. A method of processing as claimed in claim 1, wherein the analyzing step comprises a sub-step of calculating a translation parameter of the histogram, and the correcting step is adapted to derive the modified pixel values from a sum of the original pixel values and the translation parameter.

3. A method of processing as claimed in claim 1, the analyzing step comprises a sub-step of calculating a width variation parameter of the histogram, and the correcting step is adapted to derive the modified pixel values from a product of the original pixel values and the width variation parameter.

4. A method of processing as claimed in claim 3, it comprises a step of filtering the modified digital video signal so as to provide a filtered modified digital video signal for the motion estimation step.

5. A method of encoding an input digital video signal comprising the steps of:

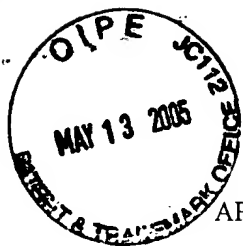
- pre-processing the input digital video signal so as to provide a modified digital video signal,

- estimating motion from the modified digital video signal so as to provide motion vectors,
 - compressing the input digital video signal from the motion vectors so as to provide an encoded digital video signal,
- wherein the pre-processing step comprises the sub-steps of :
- computing a histogram of luminance or chrominance of original values associated with pixels belonging to a video frame,
 - analyzing the histogram to provide histogram parameters, and
 - correcting the original pixel values on the basis of the histogram parameters to provide modified pixel values, which yields the modified digital video signal to be used by the motion estimating step.

6. A video encoder comprising :

- a pre-processing device for receiving an input digital video signal and for supplying a modified digital video signal,
 - a motion estimator for receiving the modified digital video signal and for supplying motion vectors,
 - a data compressor for receiving the input digital video signal and for deriving an encoded digital video signal from the motion vectors,
- wherein the pre-processing device comprises :
- means for computing a histogram of luminance or chrominance of original values associated with pixels belonging to a video frame,
 - means for analyzing the histogram in order to provide histogram parameters, and
 - means for correcting the original pixel values on the basis of the histogram parameters and adapted to provide modified pixel values, which yields the modified digital video signal for the motion estimator.

7. A computer program product for a video encoder that comprises a set of instructions, which, when loaded into the video encoder, causes the video encoder to carry out the processing method as claimed in claim 1.



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT : Francois Martin
SERIAL NO. : 09/899,878 EXAMINER : Y. Young Lee
FILED : July 6, 2001 ART UNIT : 2613
FOR : ADAPTIVE PRE-PROCESSING METHOD FOR MOTION ESTIMATION

APPEAL BRIEF TRANSMITTAL LETTER

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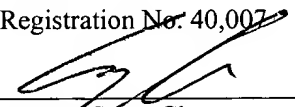
Dear Sir:

Appellants respectfully submit three copies of an Appeal Brief For Appellants that includes an Appendix with the pending claims. The Appeal Brief is now due on May 11, 2005.

Appellants enclose a check in the amount of \$500.00 covering the requisite Government Fee.

Should the Examiner deem that there are any issues which may be best resolved by telephone communication, kindly telephone Applicants undersigned representative at the number listed below.

Respectfully submitted,
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